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# THE SCIENTIFIC MONTHLY

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## THE ORIGINS OF CIVILIZATION<sup>1</sup>

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FROM THE OLD STONE AGE TO THE DAWN OF CIVILIZATION

### I.

LINNÆUS was the first natural scientist to find a place for man in the natural system. There is an enormously long stage in the career of man when the study of him is obviously the task of the natural scientist. Much of the work of the anthropologist and psychologist is properly classed as natural science. At a certain stage in the development of man, however, we begin to call the study of him and his works archeology, history, philology, art and literature—lines of study which we sharply differentiate from natural science. I have often wondered what there is unnatural about man. If it could be demonstrated that the pterodactyl was gregarious, built towns, made pottery, carried on industry and commerce, and left behind written records, I fancy that we should still call the study of him paleontology and not divorce it from natural science.

It has been a source of great gratification to the writer that in the William Ellery Hale lectures on Evolution, the career of man has been regarded as a part of the course of nature. The protoplasm is indeed a long way from the idea of liberty and the chimpanzee may antedate by millions of years the conception of social justice, but the transition from the stage of biological to that of social processes is a gradual one, even though we readily recognize that man has finally risen to many qualities and ideas which transcend matter and can not be placed under the microscope or weighed in the chemist's balances.

<sup>1</sup> Delivered before the National Academy of Sciences in Washington, D. C., April 28 and 29, 1919, as the seventh series of lectures on the William Ellery Hale Foundation.

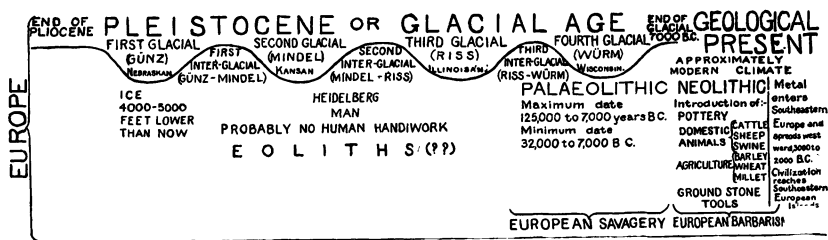


FIG. 1. DIAGRAM OF THE EUROPEAN GLACIAL AGE.

The archeologist depends on stratification just as the geologist does. He dates his strata not only by superposition, but also by the artifacts contained in them, precisely as the geologist dates his strata by the fossils they contain. As we all know, the prehistoric archeologist and the geologist work side by side, and each gladly accepts the other's results. This association brings us orientalists into intimate relations with natural science, for we carry on the work of research in the Near Orient, having, on the one hand, early prehistoric man *preceding* ancient Oriental civilization, and, on the other hand, historic Europe *following* the ancient Orient. The early Oriental civilizations thus occupy a place between the remote savagery of prehistoric Europe and the civilized career of historic Europe beginning in Greece and Italy.

My distinguished predecessors have carried the progressive development of matter through the origins of life and its evolution to ever higher forms, and have thus finally reached the early stages of the first implement-fashioning creature, which we call man. He has been followed by means of the trail of stone implements which he began to leave behind him, through the successive advances and retreats of the ice in the glacial epoch, oscillating like the pendulum of a vast geological clock, and thus measuring for us in large and still unprecise periods the several hundred thousand years of the discernible human career.

In the long struggle with the hostile forces of nature about him, the savage European hunter of the Paleolithic Age had slowly advanced through successive improvements of his weapons and tools of stone, bone, horn, ivory and wood, until the final retreat of the ice some seven or eight thousand years before the Christian era (Fig. 1). In spite of the remarkable progress which he had made and his surprising achievements in art, as illustrated in the wonderful cave paintings of southern France and northern Spain, it is evident that his general progress had been retarded as contrasted with the development of

the hunters of the Paleolithic Age on the south side of the Mediterranean. It is a natural conclusion that the retarding force was the recurring cold and ice by which Europe was so long beset, while the south side of the Mediterranean was enjoying far more genial conditions. It will therefore be necessary for us to investigate what was going on in northern Africa, long before the last glaciation of Europe had retreated. The presence of the great African mammals in glacial Europe, like the southern elephant (*Elephas meridionalis*) whose bones are found on the high terraces of the Seine and the Eure ninety feet above the present river level, demonstrates the connection of Europe with Africa in that distant age. Both at Gibraltar and through Sicily the great European peninsulas of the western Mediterranean were united with Africa by land (Fig. 2).

Just as the wild creatures crossed these land bridges from Africa to Europe and back again, so must the men who hunted them have done. The dispersion of the art of chipping flint implements throughout the contiguous areas of the two continents was a matter of course. Let it be clearly stated, however, that this unquestionable fact does not carry with it the conclu-



FIG. 2. MAP OF INTER-GLACIAL EUROPE. (After Geikie.) Showing landbridges between western Europe and Africa.

sion that the stages of prehistoric culture on both sides of the Mediterranean necessarily kept even pace with each other, and were therefore always contemporaneous. This we know was not true as between North and South America; neither was it true of prehistoric Africa and Europe. When the European Stone Age hunters received metal in the Ægean area about 3000 B.C., it was a thousand years before it had crossed Europe to Scandinavia and the British Isles. To speak of Mousterian flints found in Siberia as necessarily contemporary with those of France, is as absurd as to make Verestchagin, the Russian painter, contemporary with Titian.

The existence of North African man in European glacial times has been clearly demonstrated. The flint implements which he wrought have been found, still lying in strata of quaternary age in Algiers.<sup>2</sup> In the caves of Gafsa in Tunis Schweinfurth has also found flints of Paleolithic type, but not in stratifications or with a fauna which demonstrates their unquestionable Paleolithic age.<sup>3</sup> In the same region, furthermore, Schweinfurth has found artifacts of even pre-Chellean types, lying in deposits of coarse conglomerate (*nagelfluh* or "*poudingue*" Fr.), which the discoverer concludes were of early quaternary date. He found 411 pieces, some of which he classifies as Eoliths and everything else as Chellean or pre-Chellean.<sup>4</sup>

These early Stone Age hunters of North Africa have left more than their stone implements to tell of their existence along the southern shores of the Mediterranean. In Algiers they carved in the natural rock faces rude drawings of the animals they were daily pursuing. One of these prehistoric drawings (Fig. 3) shows us the *Bubalus antiquus*, or ancient buffalo, a creature presumably of quaternary age in this region. This again demonstrates the presence of Paleolithic hunters in North Africa.<sup>5</sup>

It is evident that the Sahara desert during the age represented by such remains, must have been a fertile region, with productive soil and plentiful precipitation. This continued until the latter part of the glacial epoch; but in the last glaciation of Europe the climate along the Nile at least, was nearer that of to-day. Graffiti and Neolithic remains in the western

<sup>2</sup> See Boule, *L'Anthropologie*, 13, 1902, pp. 109-110, against Forbes, *Bull. Liverpool Mus.*, III., 1901, No. 2.

<sup>3</sup> Schweinfurth, *Zeitschr. f. Ethn.*, 39, 1907, pp. 899-915.

<sup>4</sup> Schweinfurth, *ibid.*, 39, 1907, pp. 137-181.

<sup>5</sup> Pomel, *L'Anthropologie*, XI., also Obermaier, "*Mensch der Vorzeit*," p. 168.

Sahara would indicate its habitability, however, in time relatively recent, as the Neolithic of this region seems to have continued almost down to modern times.<sup>6</sup> Gautier concludes that the changes here have not been due to alteration of the climate during the last two thousand years, but to desiccation caused by dunes, cutting off the Sudan from the Sahara, and resulting in its absorption by the Berbers from the north.

The probabilities certainly are that fertile conditions in the Sahara during the major portion of the Pleistocene permitted the distribution of the Paleolithic hunters from Algiers to the

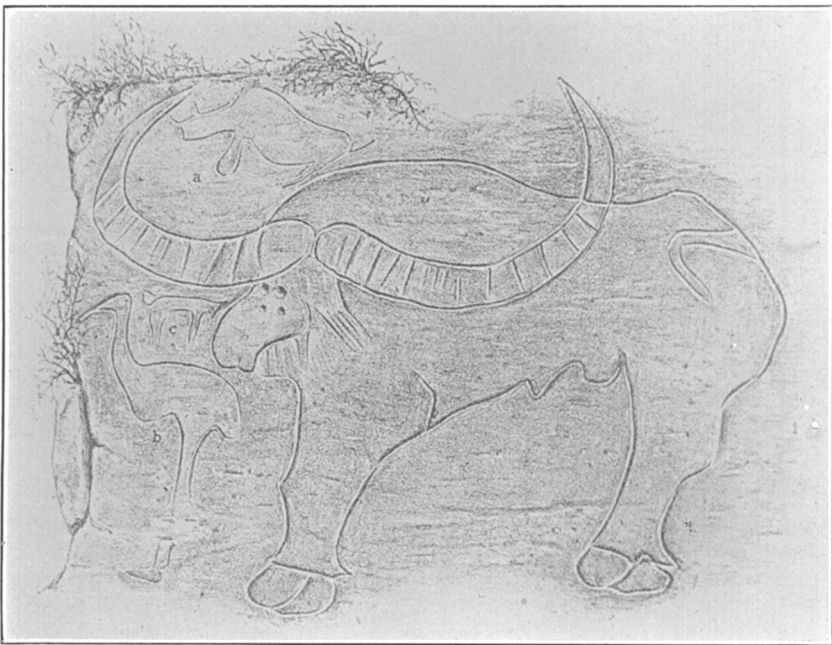


FIG. 3. ROCK GRAFFITO OF THE WILD BUFFALO (*Bubalus Antiquus*) IN ALGIERS. Carved by prehistoric hunters in the Palæolithic Age. (After Por.)

Nile. But the Nile of that period offers a geological history which we must have in mind, because it went hand in hand with the career of man in northeastern Africa.

During or just before the formation of the lower levels of the Upper Pliocene, while the Mediterranean coast line was at the site of later Cairo, two extensive fractures occurred, varying from 7 to 24 km. apart. They extended southward from the coast some four hundred miles to the vicinity of Keneh, forming what is called a "block fault" in the earth's crust. As the block between the fractures sank it formed a great rift

<sup>6</sup> E. F. Gautier, *L'Anthropologie*, 18 (1907), pp. 37-68, 314-332.

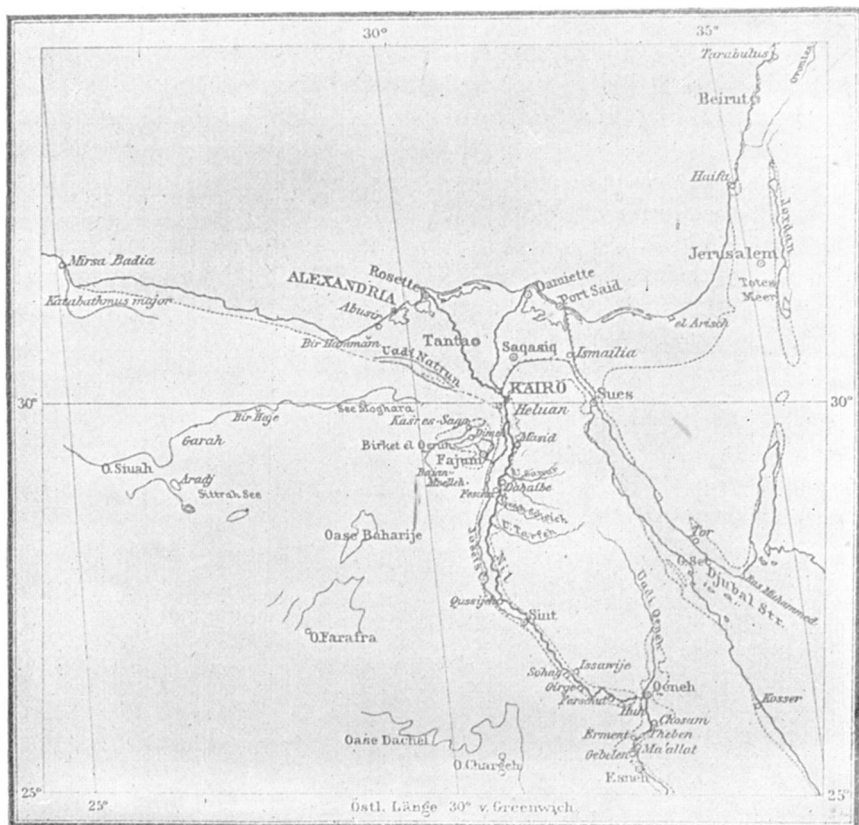


FIG. 4. MAP OF THE EGYPTIAN RIFT IN PLIOCENE-PLEISTOCENE TIMES. (After Blanckenhorn.)

or trench, stretching from the sea shore at the site of modern Cairo in latitude  $30^{\circ}$  N., to Keneh in latitude  $26^{\circ} 7'$  N. (Fig. 4). The entire rift is in the Eocene limestone. Other more local faults of varying origin carried the rift above Thebes, south of which (at Gebelen) it narrows. Measured along its bends the entire trench is almost 450 miles long. (Railway distance from Cairo to Luxor is 416 miles, and Gebelen is over 17 miles above Luxor.)

As Blanckenhorn, to whom we chiefly owe these facts, has shown,<sup>7</sup> the rift was open to the sea, which entered and penetrated as far south as Dahaibe, then about ninety miles from the sea shore. Here must have been for a time the earliest mouth of the Nile. But this was much later. The intrusion of the sea fell in the transition from the upper Middle Pliocene to

<sup>7</sup> Blanckenhorn, "Geschichte des Nil-Stroms," in *Zeitschrift der Gesell. für Erdkunde*, 1902, pp. 694-722 and 753-762.

the lower Upper Pliocene. It was contemporaneous with the beginning of increased precipitation in the Upper Pliocene, followed by the rainy transition period from the Pliocene to the Pleistocene, which Hull has called the Pluvial Period.

The narrow connection of the new Egyptian fjord with the sea was early largely blocked and the rapidly gathering fresh water of the east and northeast African drainage soon filled the rift and formed a large lake or series of lakes stretching from the region of Thebes to the sea. Into this lake or lakes plentiful streams flowed from east and west, carrying into the great trench extensive masses of conglomerates, gravels, marls, limestones, etc., which covered the bottom of the trench, and formed also in massive terraces of alternating limestone and indurated gravel along the walls of the rift (Fig. 5).

The characteristic fossil contained in these deposits is the lacustrine mollusc *Melanopsis*, the period of whose prevalence in this region seems to correspond to the already climatically cooled Upper Pliocene and Early Pleistocene especially of the first glaciation in Europe. This is at least the current and probable hypothesis. Accepting this probability, the earliest, that is to say the lacustrine, terraces of the Egyptian trench belong to late Pliocene and early Pleistocene times.

In the immediately succeeding drier period, corresponding to one of the early glacial periods (perhaps the first Inter-Glacial), the Nile stream for the first time appeared in this Egyptian rift. From this time on, river terraces were formed along its banks, though in relatively limited extent. Two of these river terraces can be discerned between the lacustrine terrace above and the alluvium below. The *higher* river terrace is from 6 to 30 m. (along its lower edge) above the level of the

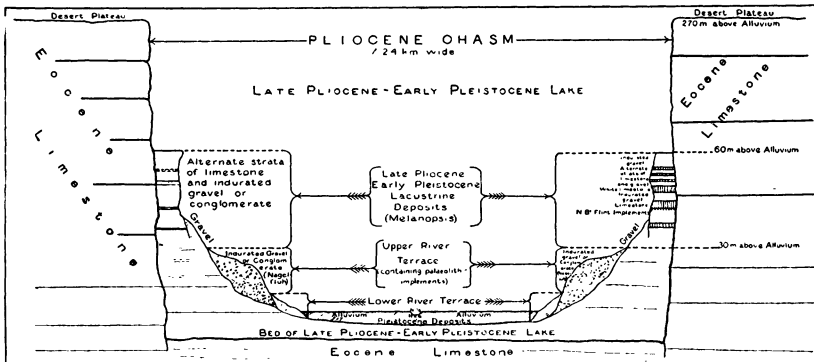


FIG. 5. SCHEMATIC CROSS-SECTION OF THE EGYPTIAN RIFT.



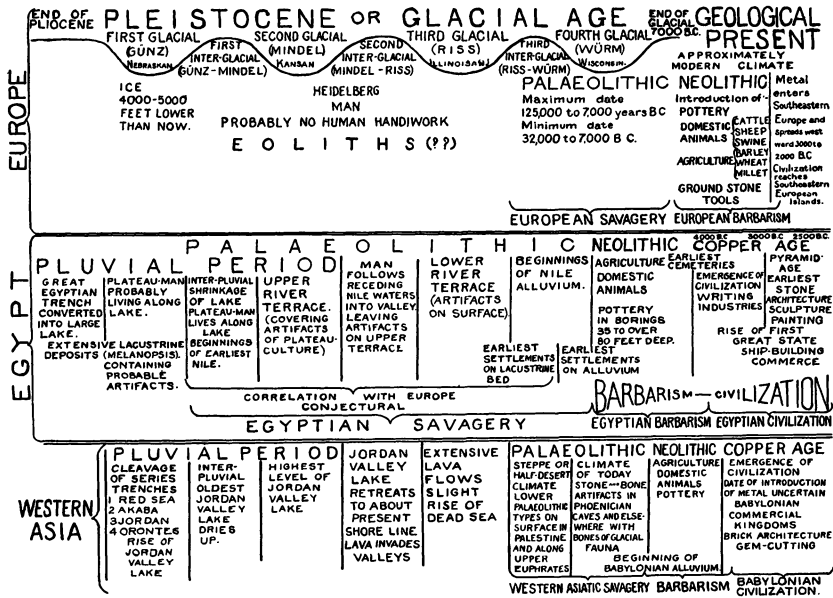


FIG. 6. DIAGRAM SHOWING ATTEMPTED CORRELATION OF GLACIAL EUROPE AND EGYPT.

alluvium; the *lower* is only 9 to 10 m. above the alluvium. The lower of the two is not everywhere observable or distinguishable, for like the typical Nile alluvium it also is made up of Nile mud, sand and fine gravel, without any coarse rubble, and it emerges as a more or less wide, gentle slope along the edge of the cultivated land, and is therefore not sharply distinguished from the latter.

The fauna of these Pleistocene deposits is confined as a rule to shells of fresh-water molluscs still living in the Nile. To these may be added only one extinct variety, the *Unio Schweinfurthi* (Martens). Very few remains of mammals have been found in deposits of this age, but they include buffalo horns and teeth of the hippo and elephant, while the marly lake deposits of the Fayum have yielded teeth, hoofs and leg bones of the horse. With these was also found the mandible of a man, later unfortunately lost. A comparison of this fauna with that of Syria has led Blanckenhorn to the conjecture, if not to the conclusion that in these southern lands, especially Egypt, there did not develop a pleistocene fauna analogous to that of glacial Europe—as if the climatic conditions, at least in the later Pleistocene, the time of prehistoric man, were not so different from those of to-day as in glaciated Europe.

After the formation of the two river terraces shown in the

cross section (Fig. 5), the Nile began laying down the present alluvial floor of the valley. For the deposit of this deep stratum of alluvium, varying from some thirty feet in depth at Thebes to over a hundred or even over a hundred and thirty feet in the Delta, it is evident that the relatively brief period since the retreat of the ice in Europe was quite insufficient. Blanckenhorn estimates that the lower half of the clayey sands and sandy clays forming so much of the Nile alluvium was deposited during the last glacial period of Europe.

To summarize, it will be seen that the geology of the Nile valley, in so far as it bears on the age of man there, displays four chief periods: I., The Lacustrine Terraces (=Pliocene and First Glacial?); II., The Upper River Terrace (=Second Glacial?); III., The Lower River Terrace (=Third Glacial?); IV., The Alluvium, Lower (=Fourth Glacial), Upper (=Post-Glacial?).

In view of the probability that the Lacustrine (Melanopsis) stage reaches over into the First Glacial, and the certainty that the lower Alluvium reaches back into the Fourth or Last Glacial it is tempting to make the Second and Third Glacial correspond respectively to the two River Terraces (Fig. 6). The four glacial ages would then be parallel with the four main periods disclosed by the Nile deposits. These geological parallels are in no sense vital to this presentation, however, with the exception of the conclusion, clearly demonstrated by Blanckenhorn, that



FIG. 7. THE NILE VALLEY ALLUVIUM AT SIUT, seen from one of the lower river terraces.

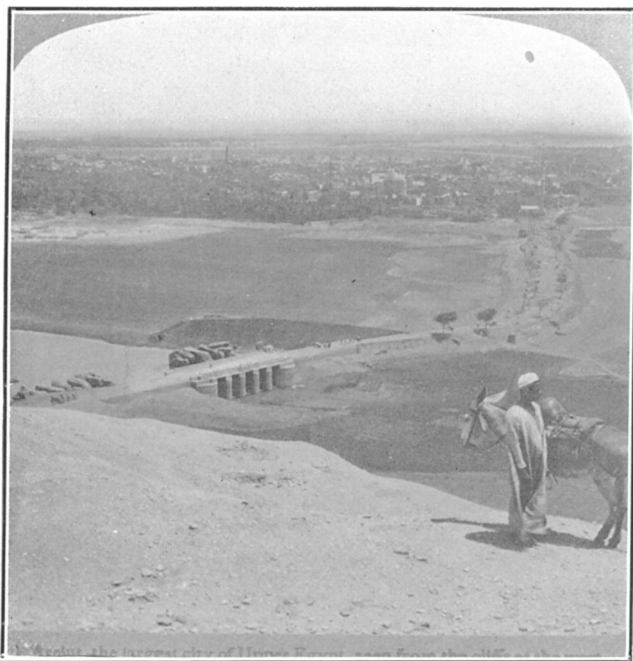


FIG. 8. THE NILE VALLEY ALLUVIUM AT SIUT, WITH RIVER TERRACE IN FOREGROUND.  
(Photograph by Underwood & Underwood.)

the Lower Alluvium corresponds to the European Fourth Glacial.

Turning now to the Nile valley as we find it to-day, the view of Siut in Fig. 7 furnishes a characteristic prospect across the black alluvial floor of the Nile valley from the distant cliffs in the east, to the western cliffs from which the photograph is taken. As we step back up the slope, we include within the range of the camera one of the lower river terraces seen in the foreground of Fig. 8. Again the cliffs near Der el-Bahri at Thebes display characteristic formations of the Lacustrine Terraces, above those of the river (Fig. 10).

These terraces are clearly correlated in a geological map of the western cliffs of Thebes by Schweinfurth (Fig. 9). The band below shows the extent of the cultivated land, the alluvium; the next band above it represents the river terrace, presumably the upper, the lower disappearing at this place, while the uppermost band shows the situation of the lacustrine terraces. According to Blanckenhorn, it will be recalled, these lacustrine deposits, characterized by the fossil mollusc *Melanopsis*, were laid down in late Pliocene—early Pleistocene times; the upper levels therefore may belong in the First Glacial

Period of Europe. At that time the Sahara plateau was habitable, and discoveries of Schweinfurth would indicate that probably as early as the European First Glacial Period, men able to produce flint implements lived along the margin of the cliffs, above the lake here at Thebes.

If Schweinfurth is correct the rude artifacts produced by these men were carried by the drainage from the shores of their plateau dwellings into the lake, where they are now embedded deep in the lacustrine terraces below the brow of the cliffs. He

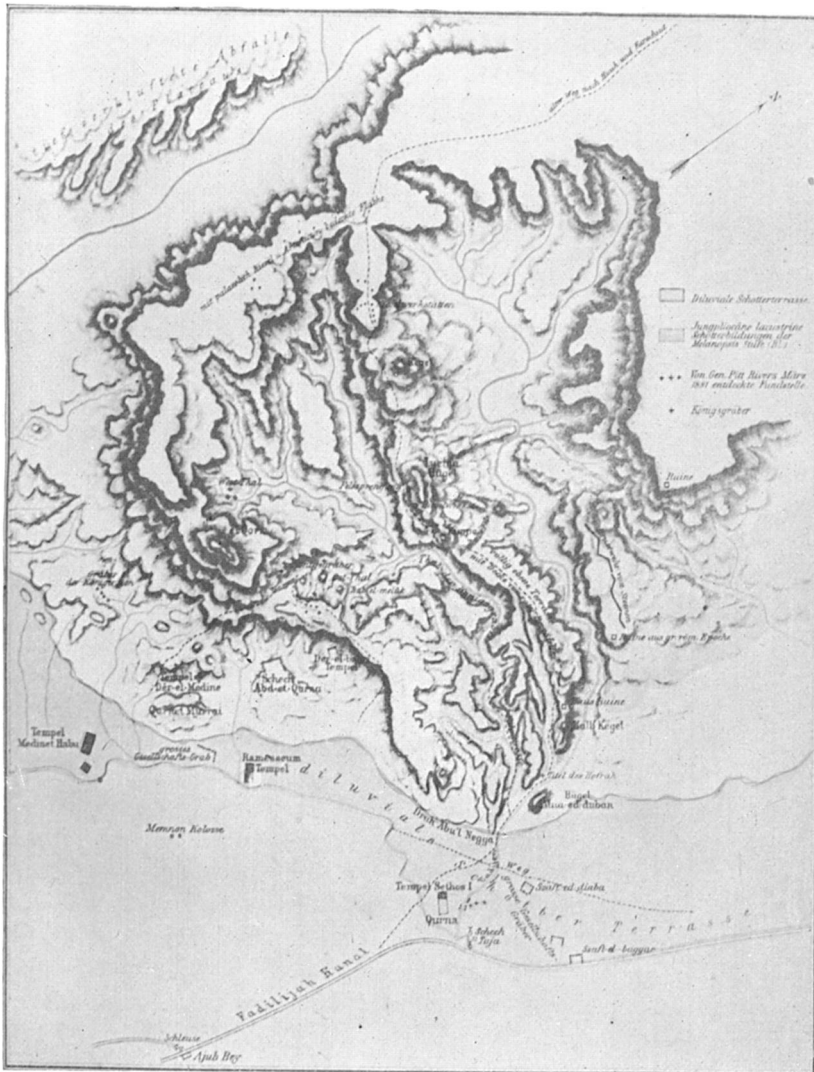


FIG. 9. GEOLOGICAL MAP OF WESTERN THEBES. (By Schweinfurth.)



FIG. 10. THE LACUSPRIND TERRACES NEAR DER EL BAHIG ON THE WEST SIDE AT TIERES. The levels containing artifacts are marked with a cross. (After Schweinfurth.)

has found them below several alternate strata of limestone and indurated gravel, which have collected some fifty feet or more above the artifacts (Fig. 10).

One form believed by Schweinfurth to have been produced by the hand of man displays the familiar "bulb of percussion"; while the edges show evidences of secondary flaking (Fig. 11). The fact that this region was never visited by the ice, makes it more probable that such flints were produced by man, in the absence of the grinding, the pressure and other forces of the ice, to which the European "coliths" were subjected.

However this may be, it is certain that far back in the European Glacial Age the North African plateau was inhabited as we have already seen. Inhospitable as the stretches of the desert along the Nile valley now look, they were once the home of man. These early plateau hunters have left traces of their presence other than their flint weapons. In 1906 a native at Abu Simbel in northern Nubia assured me that he could take me out into the Sahara to an unknown temple of which so many vague reports had reached archeologists that it had long been known to us as "the lost temple." Several hours march from the Nile, far out in the western desert, we did indeed find it

(Fig. 12). It proved to be a natural rock formation, with a door wrought also by nature, and alongside the door the records which the natives had reported as inscriptions proved interesting enough. Here were carved two boats, two giraffes, two ostriches and a number of smaller animals. The giraffe has been extinct in Egypt from very remote times, and it is possible that the hunters of Pleistocene Age have left these records in the Sahara.

Just above Thebes along the crest of the cliffs behind the Kings' Tombs (Fig. 14), these early hunters had a number of workshops, and here worked flints are still scattered so plentifully that there are stretches kilometers long, where one literally walks on artifacts, and it is difficult to find a piece of flint produced by nature. The date of artifacts found thus lying on the surface is not to be determined by the shape, workmanship and type alone. Fortunately these same artifacts may also be stratigraphically dated in the immediate vicinity.

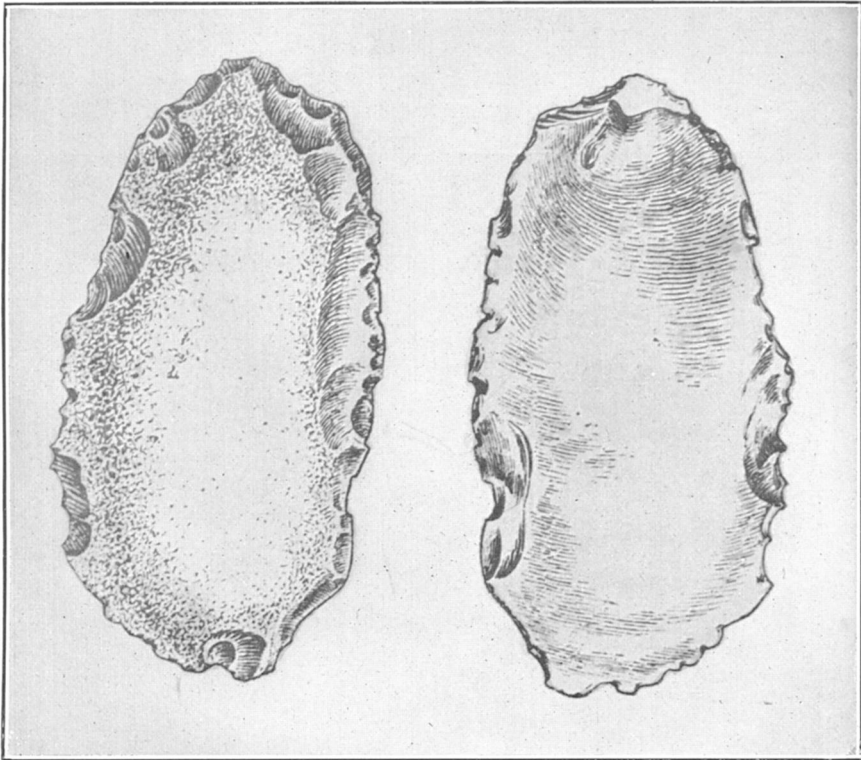


FIG. 11. HUMAN ARTIFACT FOUND WITH MANY OTHERS BY SCHWEINFURTH IN THE LACUSTRINE TERRACES OF THE NILE RIFT. They lay some fifty feet below the surface, at the point marked with a cross in Fig. 10.

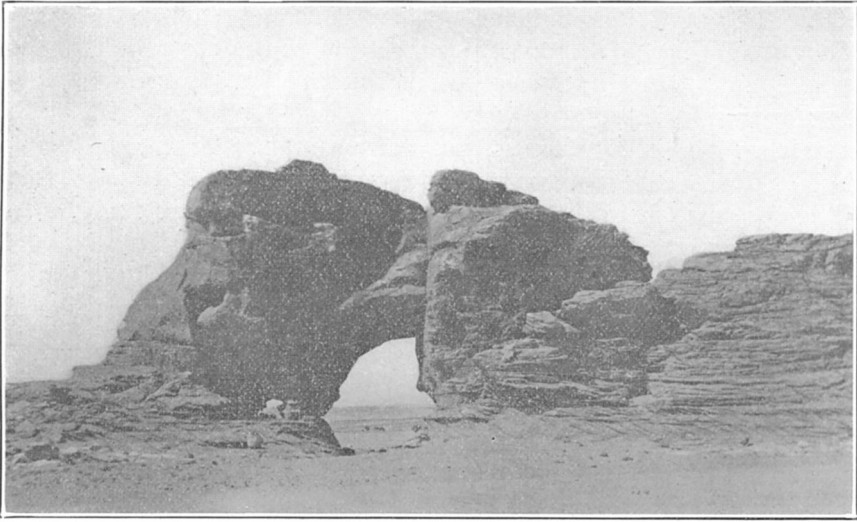


FIG. 12. THE SO-CALLED LOST TEMPLE BEHIND ABU SIMBEL IN LOWER NUBIA.

As the great Egyptian lake shrank and the earliest Nile current began to move northward in the old bed of the lake, the drainage of the latter part of the Pluvial Period carried large masses of the neighboring rock rubbish into the valley, and

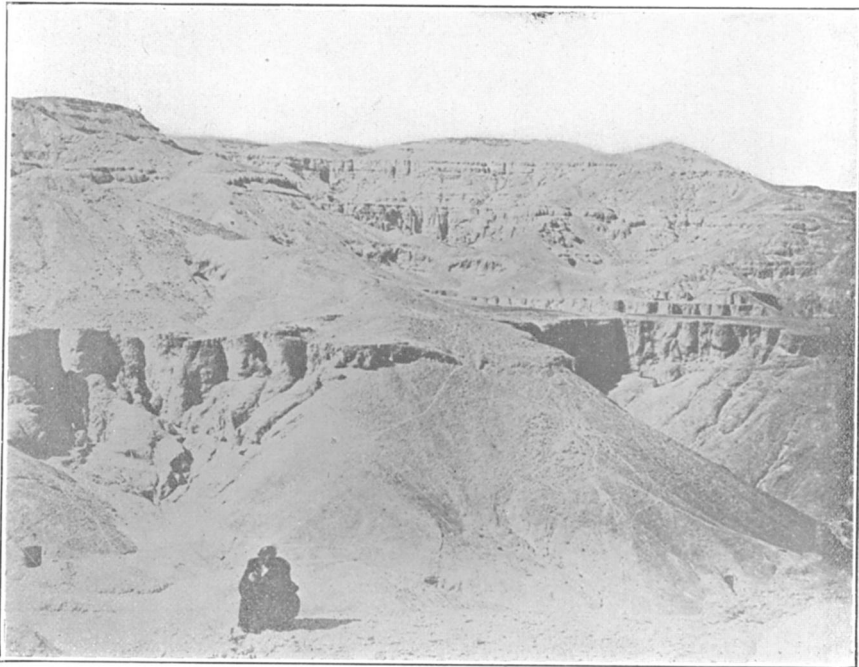


FIG. 13. THE HEIGHTS OF THE SAHARA PLATEAU ABOVE THEBES. Extensive flint workshops of Quarternary age have been found lying on the surface of the plateau.

these materials helped to form the Upper River Terrace. They carried down with them numbers of the flint artifacts already lying on the plateau, and these early works of man are now found embedded in the conglomerate and indurated gravels of the Upper River Terrace. They were first noticed by Gen. Pitt-Rivers as far back as 1881, at a spot marked with a cross by Schweinfurth on his map (Fig. 9) near the mouth of the wadi called el-Wadiyên ("the two wadis") north of Seti I's Temple of Kurna, on the road to the Kings' Tombs.

Little attention was paid to Pitt-Rivers' discovery; but over twenty years later Schweinfurth placed its correctness beyond



FIG. 14. ROCK-HEWN TOMB COURT KNOWN AS "SAFT EL-LEBEN." In the conglomerate walls of this court artifacts carried down by the drainage in Pleistocene times from the plateau above have been found. (Photograph by kindness of Winlock.)

all doubt. He found artifacts embedded in the strata of this river terrace at Kurna all along the lower end of the Wadiyên, and likewise in the neighboring large courts of the Egyptian tombs here. These courts are some 75 m. square, open on one side and with about twenty-five tomb doors cut in each of the remaining three sides (Fig. 14).

The investigations of Winlock of the Metropolitan Museum have made it extremely probable that these large courts and their arrangements belong to the Eleventh Dynasty (2160–2000 B.C.); that is to say they are over four thousand years old. The entire court and the tombs the doors of which are visible in





FIG. 15. RIVER TERRACE ALONG THE NILE AT THEBES. Here the plateau hunters lived when they shifted from the plateau down into the Nile Rift. (Photograph by Underwood & Underwood.)

Fig. 14 were therefore excavated from a conglomerate or "nagelfluh" formation, hard enough for such excavation over four thousand years ago. Here are thousands of square yards of wall surface embedded in which large numbers of flint artifacts may be found. It requires considerable effort with cold chisel and hammer to disengage these works of early man, thus embedded in a late rock formation.

The materials of which this conglomerate is composed show clearly that they came from the neighboring heights; and their situation at the lower end of a wadi leading down from the plateau leads to the same conclusion. Finally the artifacts contained in the formation are of the same types and workmanship as those found still lying on the plateau. The remains of man found in this terrace belong therefore to the plateau culture, and to a period of that culture long antedating the formation of the terrace.

When the Theban river terrace containing these artifacts was forming (compare Fig. 5), the earliest Nile was at least 15 to 20 meters (over 45–60 feet) above its present highest level. As the river declined in volume, probably during the Second Interglacial of Europe (see Fig. 6), the plateau hunters began to

shift into the valley itself, and to occupy the stretches of terrace on the river's brink. Primeval forest alternated with marsh and jungle along a raging flood of the vast river. Here on the dry and exposed rubble heaps the plateau hunters took up their dwellings. They gradually transferred their flint workshops to the brow of the upper river terrace. Here their flint implements are still found lying on the surface (Fig. 15).

Their hearths and doubtless later their wattle huts were distributed along the river terrace not far from the cliffs behind; for the vantage ground between the foot of the cliffs and the river must have been scanty at first. It was natural that they should scratch their hunting records on the rocks of the cliffs behind their homes, and it is doubtless to this stage of human life in the Nile valley that we owe many of the game animals pictured on the rocks. At a somewhat later stage the reed floats which the former plateau hunters had learned to make for crossing the river along which they had now established their dwellings, were displaced by primitive wooden boats, the earliest known. Of these also, the hunters have carved rude pictures on the walls of the Nile rift (Fig. 16). The great age of these cliff pictures is interestingly shown by the fact that the areas cut away by the

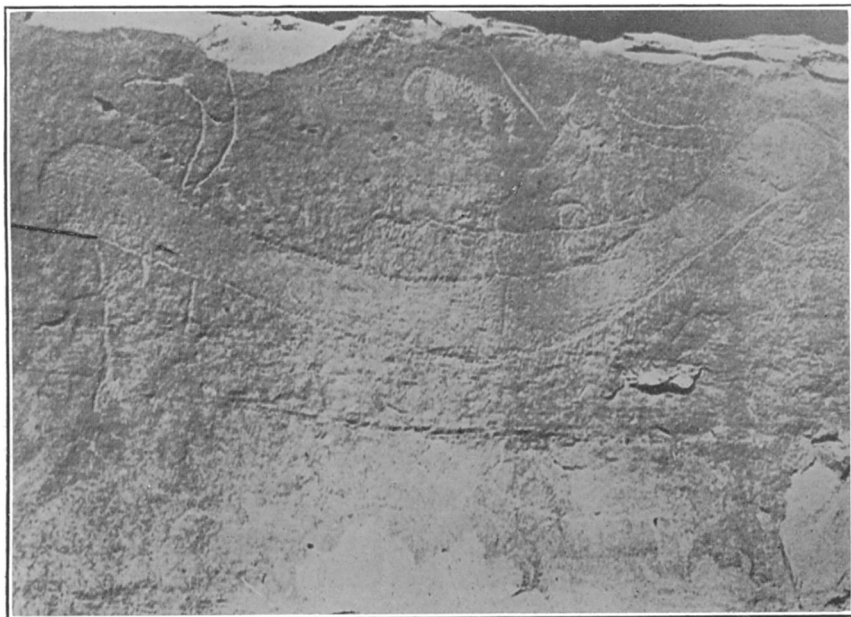


FIG. 16. CLIFF PICTURE OF A PRIMITIVE NILE HUNTER'S RUDE WOODEN BOAT. The earliest wooden craft known, cut on the cliffs at el-Kab. (After Green in *Proceedings of the Society of Biblical Archaeology*, Vol. XXV.)

ancient hunters in carving these figures are covered with a dense blackish brown patina, the somber raiment worn by all rocks in the desert and called by Walther "desert varnish." According to Lucas<sup>8</sup> it is due to oxides of iron and manganese dissolved out of the stone by the rare rains and the dews, and changed on the surface by the heat into ferric oxide and manganese dioxide, which are insoluble and dark colored. The same conclusion was earlier published by Lortet and Hugounenq<sup>9</sup>; but Linck, on the contrary, maintains that the patina is due to a fine dust deposited by the winds, and adhering finally firmly to the surface, and that it comes from without, not from within the stone.<sup>10</sup> However this may be, surfaces cut away in making hieroglyphic inscriptions some 4,500 to 5,000 years ago, have in this long interval gathered but slight traces of this desert varnish. We must conclude therefore that its presence on the cut surfaces of the prehistoric cliff pictures, if it does not demonstrate, is at least in harmony with, a very remote date for the hunters who wrought these earliest records in the Nile valley.

As the flint implements still lying on the surface show us, these earliest Egyptian hunters were advancing to occupy more and more of the valley, as the waters of the river receded. When the Nile had finally sunk to its present bed, these prehistoric Nile dwellers settled upon its shores. Often they must have dwelt directly on the dry rubble heaps and stretches of sand and clay, which once formed the bed of the Pliocene Egyptian lake. Then the river began laying down the alluvial floor which has now covered the remains of these prehistoric settlements on the old lacustrine bed of the valley. There they lie with thirty feet of alluvium over them, and there it will be impossible ever to recover them.

Thus in the Fourth Glacial Period of Europe the Nile began to deposit the fertile alluvial floor which now forms Egypt (Fig. 7). As this floor gradually spread on each side of the river, it greatly improved the conditions under which the Nile dwellers lived, and while the hunters of Europe were contending with cold and ice, these men of northeastern Africa were enjoying a mild climate, of unequalled salubrity, and likewise

<sup>8</sup> "The Blackened Rocks of the Nile Cataracts," Survey Dept., Ministry of Finance, Cairo, 1905.

<sup>9</sup> "Coloration noire des rochers formants les cataractes du Nil," *Comptes rendus, Acad. Sci.*, Tome 134, 1902, p. 109.

<sup>10</sup> Linck, "Ueber die dunklen Rinden der Gesteine der Wuesten." *Jenaische Zeitschr. f. Naturwissensch.*, 35, 1900, pp. 329-336; quoted by Schweinfurth in *Zeitschr. f. Ethn.*, 35, 1903, p. 815.

freedom from the formidable mammals which confronted the European hunters.

Proof of the existence of these remote prehistoric settlements on the lower alluvium is not wanting, although it has thus far been found only in the general latitude of the southern apex of the delta. From 1851 to 1854 L. Horner sank ninety-five pits and borings down through the alluvium in this region.<sup>11</sup> "In a large majority of the excavations and borings, the sedi-



FIG. 17. PROSTRATE COLOSSAL PORTRAIT OF RAMSES II. AT MEMPHIS.

ment was found to contain, at various depths and frequently at the lowest, small fragments of burnt brick and of pottery." We know that burnt brick could not possibly have existed in the days of the dwellers on the lower alluvium, and Horner's "burnt brick" must therefore have been simply larger fragments of pottery. His shafts around the colossal statue of Ramses II. at Memphis (Fig. 17) disclosed the lower courses of the substructure supporting the statue. He also reached the bottom of the substructure under the obelisk of Sesostris I.

<sup>11</sup> See L. Horner, "An Account of some Recent Researches near Cairo, undertaken with the View of throwing Light upon the Geological History of the Alluvial Land of Egypt," *Philosophical Transactions of the Royal Society*, Vol. 145, 1855, pp. 105-138, and Vol. 148, 1858, pp. 53-92.

at Heliopolis. His measurements enable us to compute the rate at which the alluvium has accumulated in this latitude during the last three or four thousand years. Since about 1950 B.C. the rate of accumulation at the obelisk of Sesostris I. has been about 3.90 inches per century, while at the Memphite colossus of Ramses II., since the thirteenth century B.C., it has been about 4.08 inches. There is a slight margin of uncertainty due to our ignorance of the exact ancient level of the alluvium on the substructures and our ignorance of the exact dates of the monuments.<sup>12</sup> The borings in the latitude of the obelisk, but on the opposite side of the Nile brought up pottery from depths as great as fifty feet, or even nearly sixty feet. Using the rate of accumulation for the latitude of the obelisk, we gain a date of about 15,641 to 18,410 years before 1854 for the people of the lower alluvium. That is, the indications are that these earliest makers of pottery lived from 15,700 to 18,500 years ago.

Even larger figures than these would result from computations based on the discovery of pottery in the lower alluvium at a depth of 22 meters at the southern apex of the delta by Linant Bey; or at 27 meters on the Mahmudieh Canal by Abel.<sup>13</sup> On the Damietta branch in the delta Schweinfurth reports a human skull found at a depth of 24 meters.<sup>14</sup> It will be seen that the results of computation based upon such facts as these accord very well with Blanckenhorn's demonstration that the alluvium of Egypt began to be laid down long before the end of the last European glacial period, some eight or ten thousand years ago.

The earliest settlements on the old lake bottom and along the gradually widening strip of earliest alluvium have been deeply buried by the thick stratum of the upper alluvium which now floors the valley and covers the whole space between the river terraces (Fig. 18). There lies buried all that remains of the story of an advance through the possession of pottery, the gradually acquired ability to cultivate the wild grasses, the ancestors of our own cultivated cereals, and also the conquest of the wild life and its transformation into our domestic animals. The men who accomplished these things gradually reclaimed the jungles of the Nile rift, and as the valley then enjoyed but scanty rainfall, they began to cut the first trenches

<sup>12</sup> Horner's calculations of the rate are vitiated by the incorrect dates for the monuments themselves current in his day.

<sup>13</sup> DeMorgan, "Recherches sur les Origines," I., Paris, 1896, p. 19.

<sup>14</sup> In Blanckenhorn, "Geschichte des Nilstroms," *Zeitschr. der Gesell. für Erdkunde*, 1902, 761.

for the irrigation of their little fields, the predecessors of the irrigation canals which we survey from the top of the Great Pyramid. Thus these earliest Nile dwellers slowly shifted from the life of hunters to that of tillers of the soil and breeders of flocks and herds.

As generation followed generation it was found to absorb too much of the cultivable area to bury the dead in the alluvium. They therefore began to make their cemeteries just outside of the alluvium, along its margin. As the rising alluvium spread

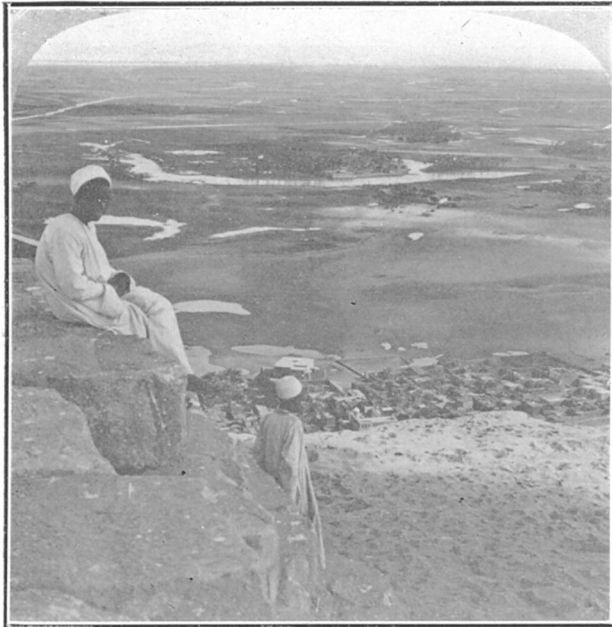


FIG. 18. THE SURFACE OF THE PRESENT UPPER ALLUVIUM OF THE NILE VALLEY. Now covering the remains of the earliest human settlements on the floor of the rift or lake bottom,—as seen from the top of the Great Pyramid. (Photograph by Underwood & Underwood.)

out over the valley across the old lake bottom, these cemeteries were covered up in their turn. There can be little doubt that they stretch in a long wandering line, roughly parallel with the edge of the alluvium which now covers them. They are not below the limit of excavation—at least the later ones would be within reach of the excavator, if they could be located. Excavation would then be quite feasible. The problem of determining the location could be solved by boring, and this should be begun on a large scale all along the margin of the alluvium, in the endeavor to find a cemetery. A single cemetery

thus discovered might reveal to us the pottery, stone implements, probably cultivated grain and even domestic animals as well as the bones and skulls of an Egyptian community thousands of years older than any predynastic community now known to us. It would furnish us with a single mile post between the Egyptian whose stone implements we have found on the river terraces, or whose pottery has been disclosed by the borings already mentioned on the one hand, and on the other the prehistoric Egyptian in possession of grain, domestic animals and metal as we find him in the earliest cemeteries now known.

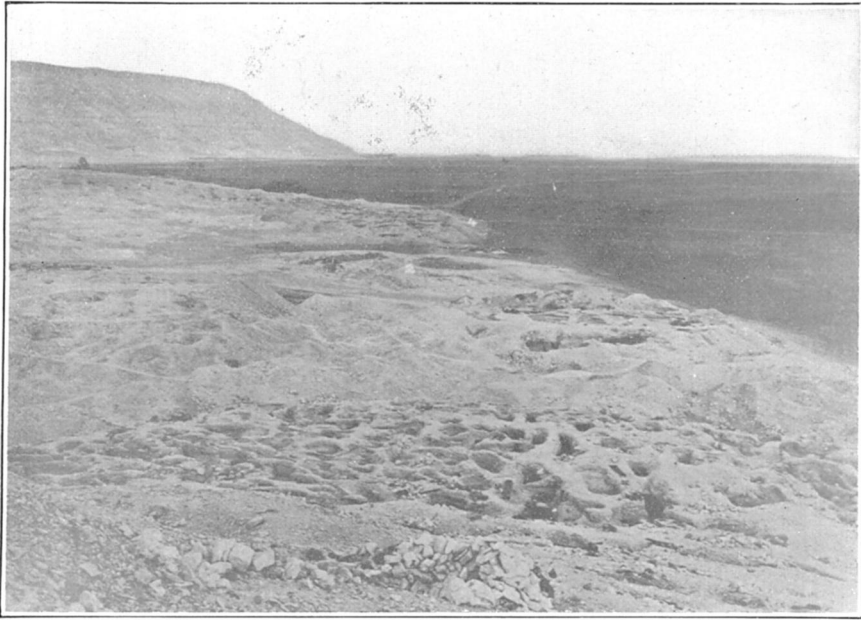


FIG. 19. A GROUP OF EARLY EGYPTIAN CEMETERIES ALONG THE RIVER TERRACE. Just outside the Margin of the Alluvium. (After Reisner, "Naga el-Der," pl. 20.)

The supposition that the cemeteries of the lower alluvial period were placed along the margin of the alluvium and just outside it, is based on good evidence. The earliest cemeteries known occupy this very position (Fig. 19). When they were first discovered about twenty-five years ago (1894-5), they suddenly revealed to us a group of pre-dynastic Egyptian communities, the earliest of which were already acquainted with metal (copper), though it was not yet plentifully used for implements. These cemeteries therefore represented an outgoing Neolithic stage. A quarter of a century of excavation among

these cemeteries has not yet carried us back into a pure Neolithic stage of culture. Must we therefore suppose that there never was any pure Neolithic culture in the Nile valley?—that the uninhabited Nile rift was invaded by outsiders already acquainted with metal?—and that for this reason the cemeteries of a metal-using people suddenly begin some centuries before 4000 B.C.? If we answer this question in the affirmative, we must assume the extinction or emigration of the pottery-makers disclosed by the borings in the lower alluvium. A population which had earlier maintained itself for many thousands of years along the Egyptian rift from the days of the plateau hunters, through their descent to the river terraces, until their occupancy of the lower alluvium and the discovery of pottery—after this enormously long occupation of the region—can not be conceived to have disappeared from northeastern Africa, leaving it uninhabited until some centuries before 4000 B.C.

It is consequently impossible to conclude that the pre-dynastic cemeteries begin suddenly and abruptly, marking the reappearance of man in the Nile rift after a period of thousands of years without any human inhabitants there. We must conclude, therefore, as we have done above, that the cemeteries which might reveal the successive earlier stages of a pure Neolithic, pre-metallic culture, bridging the present gap between the pottery-makers of the lower alluvium and the earliest pre-dynastic cemeteries now known, will be found under the present margins of the alluvium. Indeed my friend Mr. A. M. Lythgoe, of the Metropolitan Museum, while he expressed some reserve toward the above hypothesis when I proposed it to him, at the same time told me that he knew of one of the earlier cemeteries of which one edge was covered by the alluvium.

While there is a gap in our knowledge between the men of the lower alluvium revealed by the pottery of the borings and the men of the cemetery burials, it is evident that during the period represented by this gap the favored hunters of the Nile valley, not being exposed to the ice and cold of glaciated Europe, were able because of this sheltered situation in northeastern Africa, to advance so fast that they left far behind their Stone Age contemporaries all around the Mediterranean. This is shown at once in the quality of their stone implements, which had during this interval reached what we may call the Neolithic stage. The successive earlier stages represented by the flint artifacts at first left on the plateau and afterward on or embedded *in* the river terraces, while they were probably earlier than the Paleolithic implements of Europe, roughly correspond



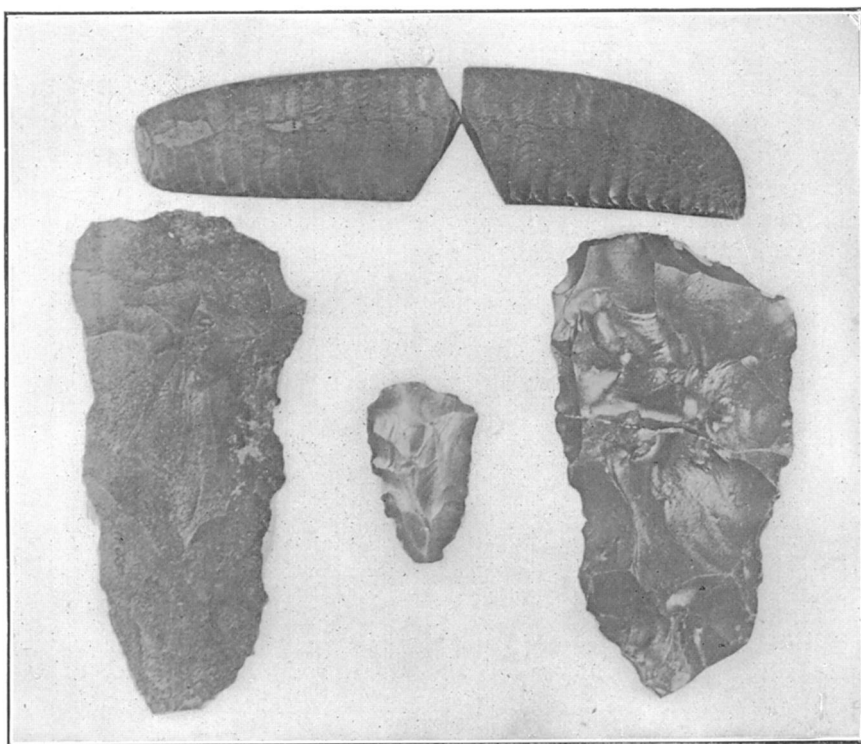


FIG. 20. THREE STAGES OF FLINT IMPLEMENTS FROM NORTHEAST AFRICA. The two below at right from the plateau; all three below are probably Palæolithic; the "ripple-flaked" knife above is from a pre-dynastic burial.

genetically to a Paleolithic stage of work (see lower artifacts in Fig. 20). The progress in the gap preceding the earliest cemeteries carried the Nile-dwellers forward to a Neolithic stage represented even in the earliest burials by superb "ripple-flaked" knives (see Figs. 20, 21). Nothing illustrates the superiority of the prehistoric Egyptian over all his contemporaries in other lands more conclusively than the remarkable precision, beauty and regularity of these flint knives. Nowhere in the world, indeed, have Neolithic craftsmen ever produced anything which can be compared with this work. This advance of Egypt demonstrates an industrial superiority over Europe and Asia beginning in the middle of the fifth millennium B.C., which was maintained some four thousand years and was never lost until the advance of Greek industry and commerce in the sixth century B.C.

The other leading craft possessed by these men of the earliest cemeteries was that of making pottery (Fig. 22), as we

might expect in view of the fact that their ancestors of the lower alluvium were already producing it. It contained a large proportion of Nile mud, and with its black-topped, red polished forms, or red polished with white line decoration and brown or black incised, this earliest cemetery ware is now well known.

It is impossible to offer here a complete inventory of the content of these earliest known burials in the Nile valley, but we may notice the presence of hand-bored stone vessels, face-paint palettes made of slate, and often bearing traces of the face-paint once ground upon them; besides many objects of ivory, like "figures, combs, hair pins, bracelets, rings, vessels, harpoons, etc."<sup>15</sup>

The people who thus equipped their dead lived in small settlements along the margin of the alluvium; for the presence of the cemetery of course means that a community of living people dwelt not far away in the cultivated area. A group of wattle huts furnished their dwellings, and around these stretched fields of barley, millet and wheat, with patches of flax, while grazing near were flocks of sheep and goats, and herds of long-horned cattle. Donkeys were already bearing the peasant's burdens from field to village, or village to market. The

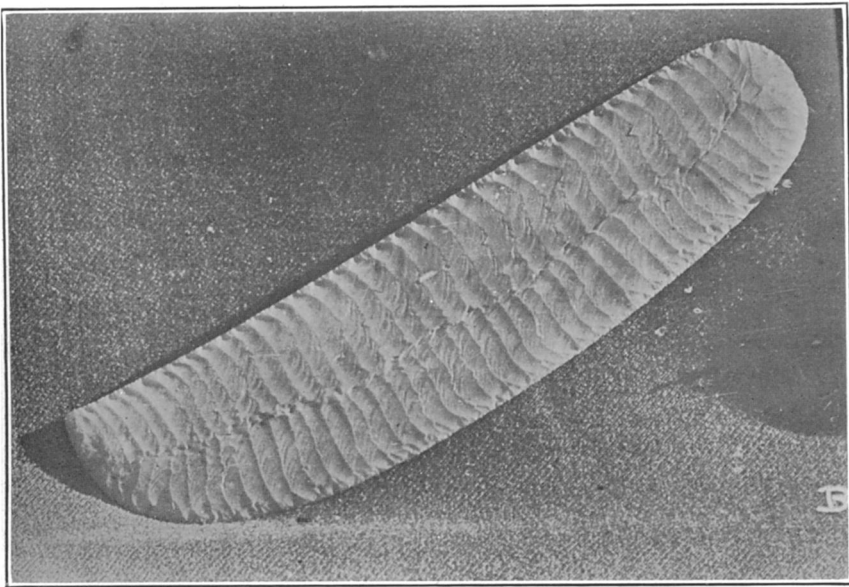


FIG. 21. FLINT KNIFE, RIPPLE-FLAKED ON ONE SIDE AND GROUND ON THE OTHER. From a burial in the pre-historic cemetery of Abadiyeh, Egypt. (Photograph by Petrie.)

<sup>15</sup> Reisner, "Archæological Survey of Nubia," Vol. I., p. 316.

great jungles and marshes which once stretched far along the valley, the home of the tropical beasts so long pursued by the plateau hunters and the men of the river terraces, had now been reclaimed and drained and made fit for cultivation of vegetable foods, or the pasturage of flocks and herds. A vast northeast African game preserve had thus been transformed from a jungle into the fertile home of the earliest cultivators of the soil



FIG. 22. POTTERY IN AN EARLY PREDYNASTIC BURIAL OF EGYPT. (After photograph by Reisner.)

and breeders of cattle and sheep anywhere known on earth. The settlements of these earliest agriculturists and cattlebreeders stretched far along the valley from lower Nubia<sup>16</sup> to the sea, and now these vanished generations, who originated animal husbandry and domesticated our food-grains still sleep in these cemeteries, scattered along the margin of the alluvium. Their villages have disappeared, but these cemeteries, discovered only twenty-five years ago, are great repositories of the life which once went on in the vanished settlements.

The character of the food supply is revealed by an examination of the bodies from these cemeteries. The stomachs and alimentary tracts of practically all such bodies from the very earliest cemeteries contain husks of barley, while about ten per cent. also contain millet (*Panicum colonum*) of a species no longer cultivated. The husks of barley are much more difficult to detach from the kernel than those of wheat or emmer, the other prehistoric cultivated grains, and these latter, though they did not carry their husks with them into the bread, may also have been present in the bodies examined,<sup>17</sup> but do not happen to be represented by husks.

Emmer is a kind of split wheat (*Triticum dicoccum*), now very little cultivated. The wild form called by Koernicke and

<sup>16</sup> Reisner, "Archæological Survey of Nubia," Vol. I.

<sup>17</sup> See remarks of Netolitzky, to whom these researches were entrusted by Elliot Smith, in Hrozny, "Getreide," p. 178.

Aaronsohn *Triticum dicoccum dicoccoides* (better by Cook, *T. hermonis*), was discovered by Aaronsohn in 1906 on and around Mt. Hermon in north Palestine, and later as far south as Moab in the trans-Jordan country. In 1910 it was also discovered in western Persia on the Kermanshah road in the Zagros Mountains. There is no doubt, according to Koernicke, that we must recognize in wild emmer the ancestor of cultivated wheat. The

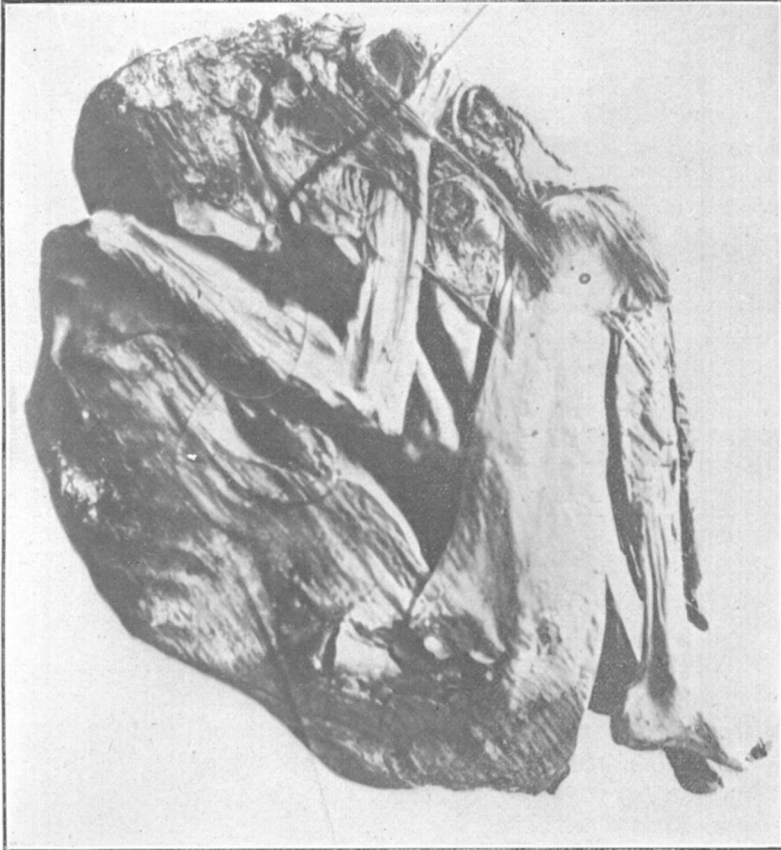


FIG. 23. BODY OF A WOMAN FROM A PREDYNASTIC BURIAL IN EGYPT. In the Field Museum of Natural History, Chicago.

cultivated form of emmer differs but slightly from the wild variety, and the development of our common varieties of wheat (*T. vulgare*, *turgidum*, etc.) must have consumed a long period of time, and required persistent practise of selection. Nevertheless, domestic wheat, with its long career of selective cultivation behind it, already appears in these earliest Egyptian communities, along with the little altered cultivated emmer.

It is interesting to notice that wild emmer is always found growing together with wild barley (*Hordeum spontaneum*), which is common in western Asia. The two were without doubt used together as food by early man, while they were still in a wild state, and domesticated together. Whether all this was done in western Asia or northeastern Africa can be determined with certainty, if ever, only when the botanical exploration of the Near East, at present hardly begun, shall have been thoroughly completed.

It should be noted that the grain found in the bodies of the prehistoric Egyptians and in the pottery jars accompanying them, dating back of 4000 B.C., is the oldest cultivated grain known to us, by over a thousand years. The nummulitic limestone crevices in which Aaronsohn found wild emmer growing in Palestine, are of course plentiful along the Nile, for such stone forms much of the material out of which the Nile terraces were built up. Here then, after using the wild barley and emmer seeds as food for ages, these early Nile dwellers may have begun to plant and cultivate them. It is only after ages of selective cultivation, as shown by the wheat, that the situation is revealed to us in these oldest cemeteries of the world. The long process of selective cultivation which had produced wheat before 4000 B.C., might therefore carry us back of 5000 B.C. for the beginning of the cultivation of grain, and the rise of agriculture.

It is also important to notice that such bodies as Fig. 23 often lie on a reed mat, with flaxen cord, and that some of them are wrapped in linen already displaying a good deal of textile skill. This is the oldest linen known to us, by an enormous margin. The fields of flax which furnished this linen represent a flax culture already very old, and descended probably from a time when the Nile dwellers originated the cultivation of flax.

(To be continued.)